

APPENDIX IIIA:
ONE-POINT LIQUID LIMIT TEST

- * 1. INTRODUCTION: The one-point liquid limit test is based on the experience that the slope of the liquid limit flow line for soils within a given geologic environment is essentially a constant on a logarithmic plot. Thus, the liquid limit can be determined from one test point provided the constant defining the slope has been established from correlations on the soil in question. The one-point liquid limit test shall be used only in those areas where the soils are geologically similar and adequate correlations defining the slope of the liquid limit flow line have been made.

This test is best performed by technicians who have experience performing the four-point liquid limit described in Appendix III and who can judge closely the consistency required to cause closure at 20-30 blows. It is generally simpler and faster for inexperienced technicians to perform the four-point limit until experience has been gained.

2. APPARATUS AND PREPARATION OF SAMPLE. The apparatus required is the same as that listed in paragraph 2 of Appendix III, LIQUID AND PLASTIC LIMITS. The sample is prepared in the same manner as that described in paragraph 4 for the standard liquid limit test except that the soil to be tested is prepared initially to a consistency that will require between 20 and 30 blows to cause closure.

3. PROCEDURE

- a. Proceed as described in Appendix III, LIQUID AND PLASTIC LIMITS, paragraph 5a(1) through 5a(5) except that the

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* number of blows required to close the groove shall be 20 to 30. If less than 20 or more than 30 blows are required, adjust the water content of the soil and repeat the procedure.*

b. Immediately after removing a water content specimen as described in paragraph 5a(5) of Appendix III, reform the soil in the cup adding a small amount of soil to make up for that lost in the grooving and water content sampling operations. Repeat 5a(1) through 5a(5) of the above appendix, and, if the second closing of the groove requires the same number of drops or no more than two drops difference, secure another water content specimen. Otherwise, remix the entire specimen and repeat.

c. Determine water contents of specimens as described in paragraph 5a(8) of the above appendix.

4. CALCULATIONS

a. (Determine the liquid limit for each water content specimen using the following equation:

$$LL = W_N \left(\frac{N}{25} \right) \tan \beta$$

where

W_N = water content

N = the number of blows causing closure of the groove
at water content

$\tan \beta$ = slope of the flow line

* Excess drying or inadequate mixing will cause the number of blows to vary.

* For those soils having an average slope of the liquid limit flow line of $\tan \beta = 0.121$,† the equation $LL = K(W_N)$ may be used where K = a factor given in Table 1. The liquid limit is the average of the two trial liquid limit values.

b. If the difference between the two trial liquid limit values is greater than one percentage point, repeat the test.

5. POSSIBLE ERRORS. Since this test is identical to the liquid limit test except for the method of calculating the liquid limit, it would be subject to the same possible errors listed in paragraph 10 of Appendix III, LIQUID AND PLASTIC LIMITS.

TABLE 1. Factors for Obtaining Liquid Limit
 from Water Content and Number of Drops
 Causing Closure of Groove

<u>N</u> <u>Number of Drops</u>	<u>K</u> <u>Factor for Liquid Limit</u>
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

† U.S. Army Engineer Waterways Experiment Station, CE, Comparison of Results of Liquid Limit Tests by Standard and One-Point Methods, Miscellaneous Paper No. 3-488 (Vicksburg, Miss., April 1962).